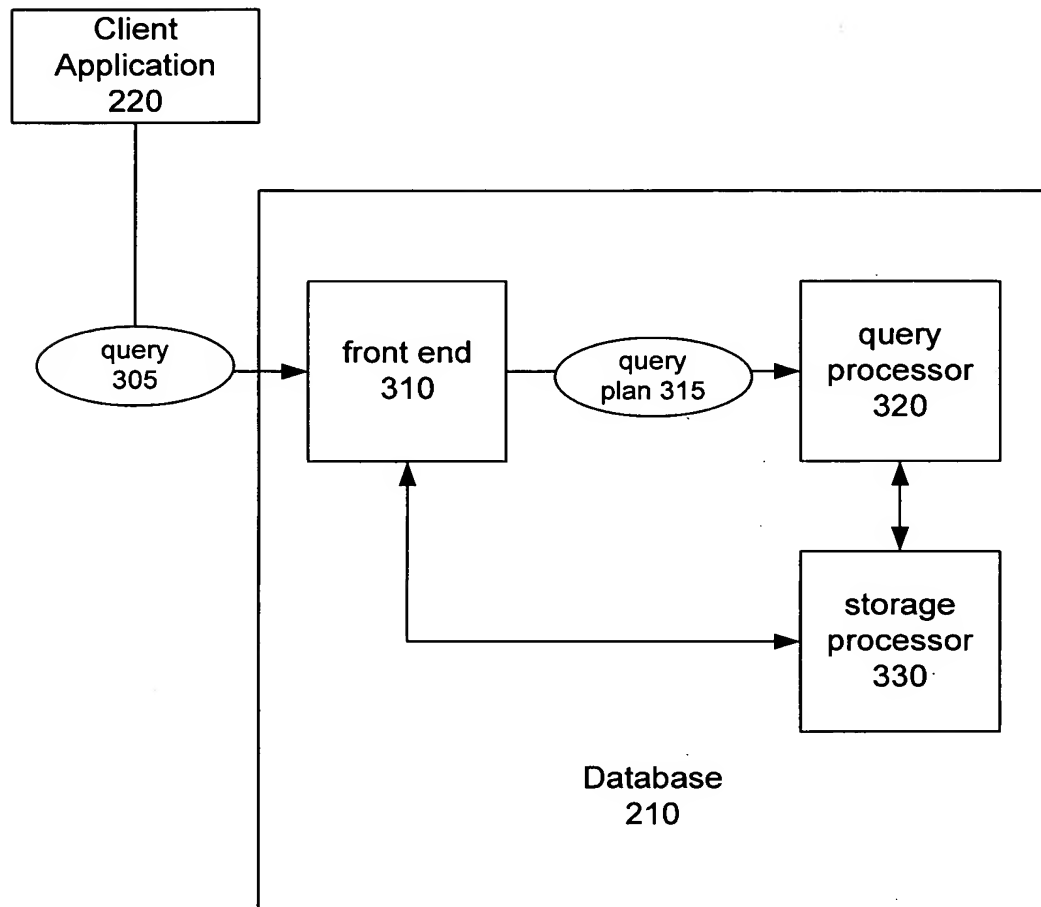


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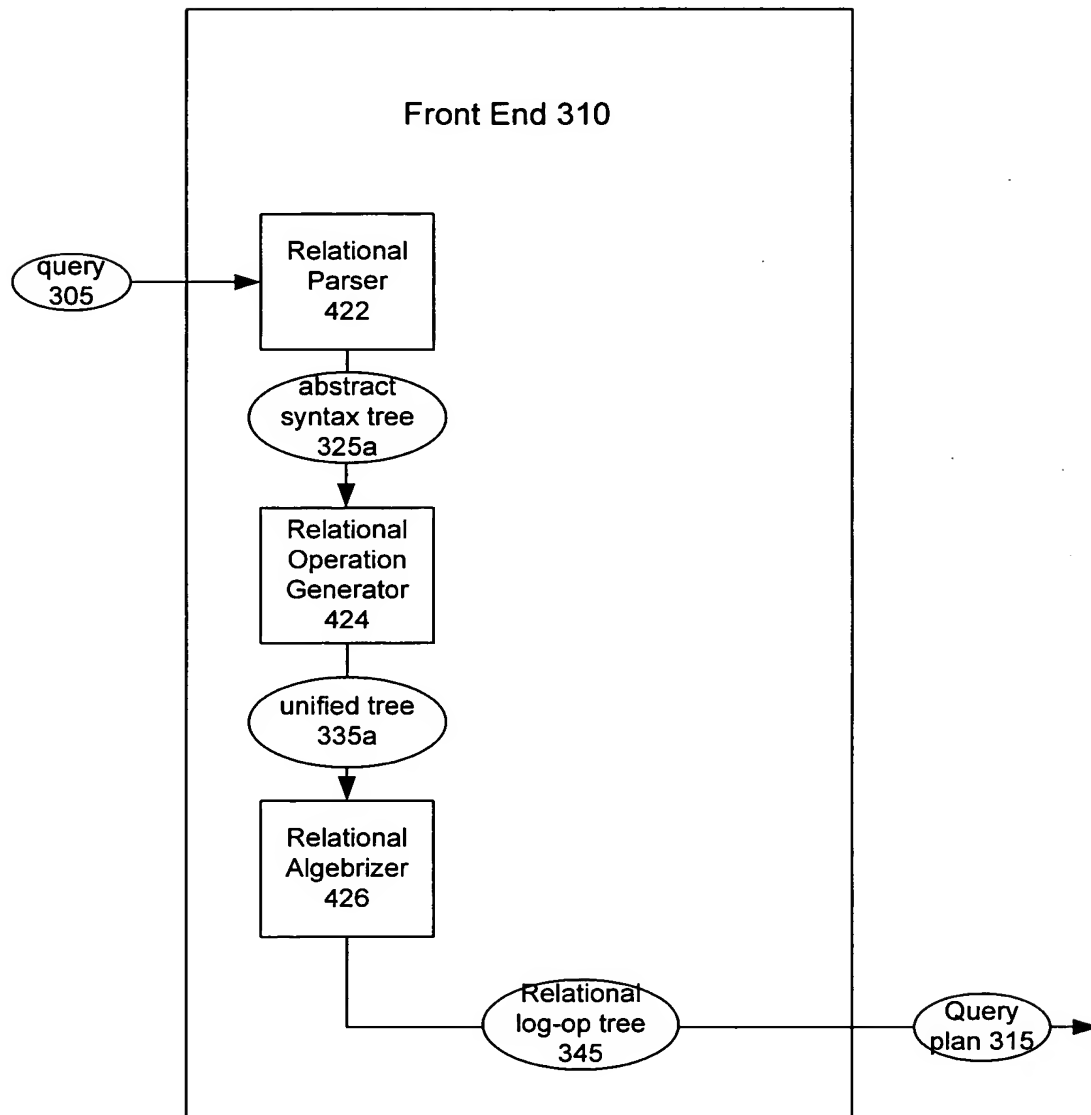
Fig. 1



(Prior Art)

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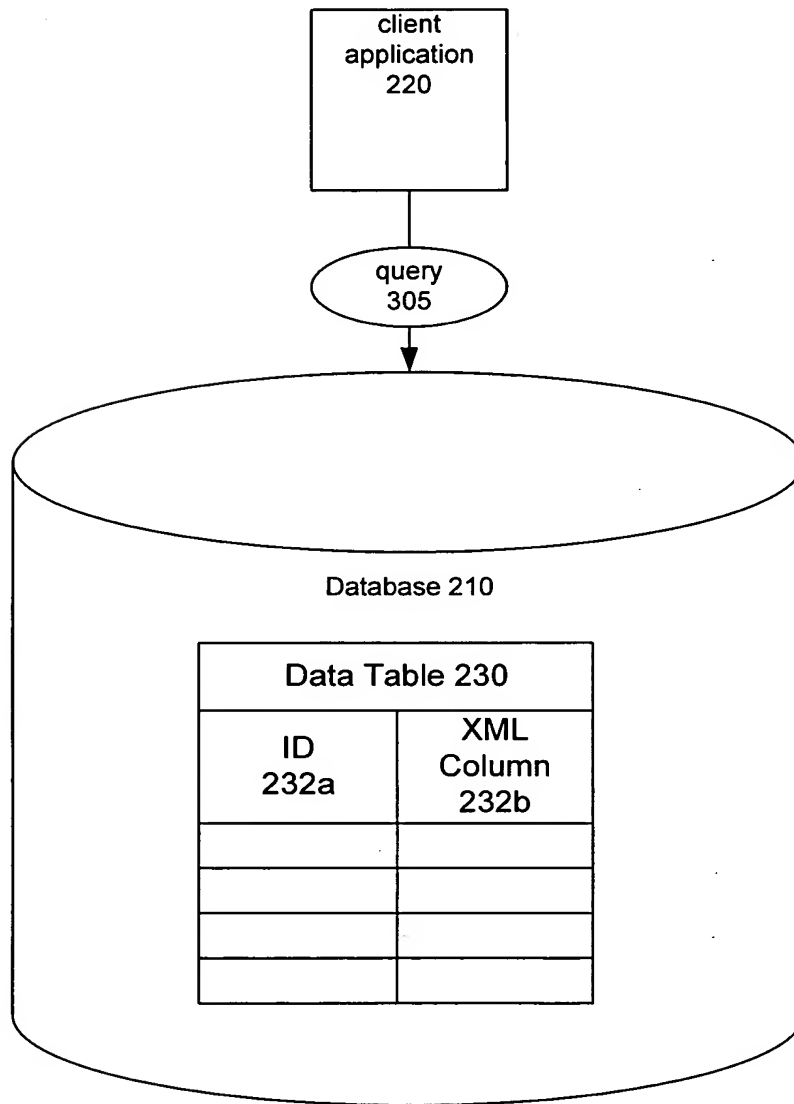
Fig. 2



(Prior Art)

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Fig. 3



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Fig. 4

400

```
CREATE XML SCHEMA COLLECTION xs_people AS
'<schema xmlns="http://www.w3.org/2001/XMLSchema"
  targetNamespace="people-uri"
  xmlns:p="people-uri">
  <element name="person" maxOccurs="unbounded">
    <complexType>
      <sequence>
        <element ref="p:name" />
        <element ref="p:emailaddress" />
        <element ref="p:phone" minOccurs="0" maxOccurs="1" />
        <element ref="p:address" minOccurs="0" maxOccurs="1" />
        <element ref="p:homepage" minOccurs="0" maxOccurs="1" />
        <element ref="p:creditcard" minOccurs="0" maxOccurs="1" />
        <element ref="p:profile" minOccurs="0" maxOccurs="1" />
      </sequence>
      <attribute name="id" type="string" use="required" />
    </complexType>
  </element>
  <element name="name" type="string"/>
  <element name="emailaddress" type="anyURI" />
  <element name="phone" type="string" />
  <element name="address">
    <complexType>
      <sequence>
        <element ref="p:street" />
        <element ref="p:city" />
        <element ref="p:country" />
        <element ref="p:province" minOccurs="0" maxOccurs="1" />
        <element ref="p:zipcode" />
      </sequence>
    </complexType>
  </element>
  <element name="street" type="string" />
  <element name="city" type="normalizedString" />
  <element name="province" type="string" />
  <element name="zipcode" type="string" />
  <element name="country" type="normalizedString" />
  <element name="homepage" type="anyURI" />
  <element name="creditcard" type="string" />
  <element name="profile">
    <complexType>
      <sequence>
        <element ref="p:interest" minOccurs="0"
maxOccurs="unbounded" />
        <element ref="p:education" minOccurs="0" maxOccurs="1" />
        <element ref="p:gender" minOccurs="0" maxOccurs="1" />
        <element ref="p:business" />
        <element ref="p:age" minOccurs="0" maxOccurs="1" />
      </sequence>
      <attribute name="income" type="decimal" use="optional" />
    </complexType>
  </element>
  <element name="interest">
    <complexType>
      <attribute name="category" type="string" use="required" />
    </complexType>
  </element>
  <element name="education" type="normalizedString" />
  <element name="income" type="decimal" />
  <element name="gender" type="token" />
  <element name="business" type="string" />
  <element name="age" type="short" />
</schema>
```

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Fig. 5

500

```

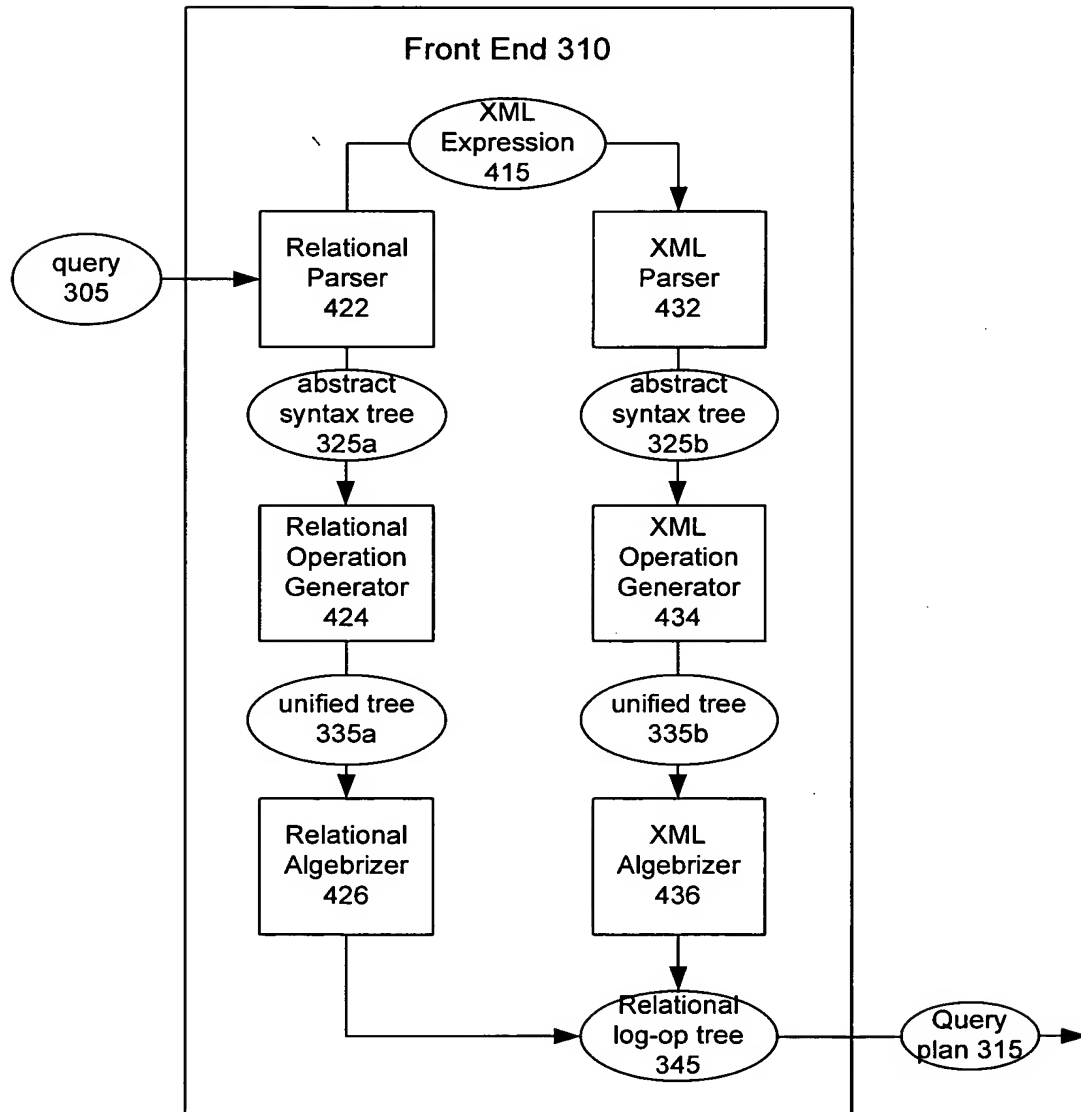
insert into people values(1,
<person xmlns="people-uri" id="person0">
  <name>Huei Demke</name>
  <emailaddress>mailto:Demke@uu.se</emailaddress>
  <address>
    <street>95 Grinter St</street>
    <city>Macon</city>
    <country>United States</country>
    <zipcode>32</zipcode>
  </address>
  <creditcard>8182 1228 4493 3873</creditcard>
  <profile income="55386.86">
    <education>High School</education>
    <gender>male</gender>
    <business>No</business>
    <age>37</age>
  </profile>
</person>')

insert into people values(2,
<person xmlns="people-uri" id="person1">
  <name>Daishiro Juric</name>
  <emailaddress>mailto:Juric@rwth-aachen.de</emailaddress>
  <phone>+55 (692) 72096539</phone>
  <address>
    <street>5 Pinet St</street>
    <city>Athens</city>
    <country>United States</country>
    <province>Vermont</province>
    <zipcode>13</zipcode>
  </address>
  <homepage>http://www.rwth-aachen.de/~Juric</homepage>
  <creditcard>7833 6950 5399 8913</creditcard>
</person>
<person xmlns="people-uri" id="person2">
  <name>Kawon Unni</name>
  <emailaddress>mailto:Unni@l1n1.gov</emailaddress>
  <phone>+59 (866) 983647</phone>
</person>')

```

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Fig. 6



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Fig. 7

325b

```
[1E5A3B14] <list>
[1E5A3AE4]      name      [path=child::{"people-uri"}p:name'child::{"people-uri"}p:person']
{"people-uri"}p:name'
[1E5A3A74]      / [type=element(p{people-uri}:name,xs:string) *] [path=child::{"people-
uri"}p:name'child::{"people-uri"}p:person']
[1E5A3974]      decon [type=Integer] value='21'
[1E5A3944]      > [type=x:boolean ?]
[1E5A05F4]      coerce [type=x:integer ?]
[1E5A059C]      data() [type=x:short ?]
[1E5A3914]      name      [path=child::{"people-
uri"}p:age'child::{"people-uri"}p:profile'child::{"people-uri"}p:person'] {"people-uri"}p:age'
[1E5A38E4]      / [type=element(p{people-uri}:age,xs:short) ?]
[path=child::{"people-uri"}p:age'child::{"people-uri"}p:profile'child::{"people-uri"}p
:person']
[1E5A37EC]      name      [path=child::{"people-
uri"}p:profile'child::{"people-uri"}p:person'] {"people-uri"}p:profile'
[1E5A38B4]      / [type=element(p{people-uri}:profile) ?]
[path=child::{"people-uri"}p:profile'child::{"people-uri"}p:person']
[1E5A3884]      var [type=element(p{people-uri}:person)]
[path=child::{"people-uri"}p:person'] TEMP<1>
[1E5A37BC]      [index] [type=element(p{people-uri}:person)] [/nested]
[1E5A378C]      name      [path=child::{"people-uri"}p:person'] {"people-
uri"}p:person'
[1E5A372C]      / [type=element(p{people-uri}:person) *] [path=child::{"people-
uri"}p:person']
[1E5A375C]      <cur.root> [type=document {...}]
[1E5A3A44]      pred-ctx [type=element(p{people-uri}:person) *] [path=child::{"people-
uri"}p:person']
[1E5A39E4]      var [type=element(p{people-uri}:person)] TEMP<1>
```

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Fig. 8

335b

```

<XmlOp_Apply VarName="#3" Simple="Yes" >
  <XmlOp_Select VarName="%1" >
    <XmlOp_Path Path="/Child:Element(people-uri:person)" >
      </XmlOp_Path>
      <XmlOp_Compare Operator=">" >
        <XmlOp_Coerce Simple="Yes" >
          <XmlOp_Accessor Type="Value" >
            <XmlOp_Path Path="/Child:Element(people-
uri:profile)/Child:Element(people-uri:age)" Context="%1"
ContextPath="/Child:Element(people-uri:person)" >
              </XmlOp_Path>
            </XmlOp_Accessor>
          </XmlOp_Coerce>
          <XmlOp_Constant Value="numeric,Not
Owned,Value=(len,prec,scale)=(9,38,10)" >
            </XmlOp_Constant>
          </XmlOp_Compare>
        </XmlOp_Select>
        <XmlOp_Path Path="/Child:Element(people-uri:name)" Context="#3"
ContextPath="/Child:Element(people-uri:person)" >
          </XmlOp_Path>
        </XmlOp_Apply>

```


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Fig. 9a

345

```

LogOp_Project
LogOp_Apply (x jtInner)
LogOp_Select
LogOp_Join /* /p:person */
LogOp_Select
LogOp_Get TBL: xidx_people(alias TBL: person:1) xidx_people
ScaOp_Comp x cmpEq
ScaOp_Identifier QCOL: [xmlalqdocidx].[dbo].[people].p_id
ScaOp_Identifier QCOL: [person:1].pk1
LogOp_ConstTableGet (1) [empty]
ScaOp_Comp x cmpEq
ScaOp_Identifier QCOL: [person:1].hid
ScaOp_Const
ScaOp_Exists
LogOp_Join
LogOp_Select
LogOp_Project
LogOp_Select /* p:person/p:profile/p:age */
LogOp_Join
LogOp_Select
LogOp_Get TBL: xidx_people(alias TBL: age:2) xidx_people
ScaOp_Comp x cmpEq
ScaOp_Identifier QCOL: [xmlalqdocidx].[dbo].[people].p_id
ScaOp_Identifier QCOL: [age:2].pk1
LogOp_ConstTableGet (1) [empty]
ScaOp_Comp x cmpEq
ScaOp_Identifier QCOL: [age:2].hid
ScaOp_Const
ScaOp_Logical x lopAnd
ScaOp_Comp x cmpEq
ScaOp_Identifier QCOL: [person:1].id
ScaOp_Intrinsic getancestor
ScaOp_Identifier QCOL: [age:2].id
ScaOp_Const
ScaOp_Comp x cmpLe
ScaOp_Identifier QCOL: [person:1].id
ScaOp_Identifier QCOL: [age:2].id
ScaOp_Comp x cmpGt
ScaOp_Intrinsic getdescendantlimit
ScaOp_Identifier QCOL: [person:1].id
ScaOp_Identifier QCOL: [age:2].id

```

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AncOp_PrjList

Fig. 9b

```

ScaOp_Comp x cmpIsNot
  ScaOp_Identifier QCOL: [age:2].value
  ScaOp_Const

LogOp_Project
  LogOp_ConstTableGet (1) [empty]
  AncOp_PrjList
    AncOp_PrjEl COL: Expr1007
      ScaOp_Const

ScaOp_Comp x cmpGt
  ScaOp_Identifier QCOL: [age:2].value
  ScaOp_Convert sql variant, Null, Var, ML=8016
    ScaOp_Identifier COL: Expr1007

LogOp_Select /* p:person/p:name */
  LogOp_Join
    LogOp_Select
      LogOp_Get TBL: xidx_people(alias TBL: name:3) xidx_people
      ScaOp_Comp x cmpEq
        ScaOp_Identifier QCOL: [xmlalqdocidx].[dbo].[people].p_id
        ScaOp_Identifier QCOL: [name:3].pk1
      LogOp_ConstTableGet (1) [empty]
      ScaOp_Comp x cmpEq
        ScaOp_Identifier QCOL: [name:3].hid
        ScaOp_Const
      ScaOp_Logical x lopAnd
        ScaOp_Comp x cmpEq
          ScaOp_Identifier QCOL: [person:1].id
          ScaOp_Intrinsic getancestor
            ScaOp_Identifier QCOL: [name:3].id
            ScaOp_Const
        ScaOp_Comp x cmpLe
          ScaOp_Identifier QCOL: [person:1].id
          ScaOp_Identifier QCOL: [name:3].id
        ScaOp_Comp x cmpGt
          ScaOp_Intrinsic getdescendantlimit
            ScaOp_Identifier QCOL: [person:1].id
            ScaOp_Identifier QCOL: [name:3].id

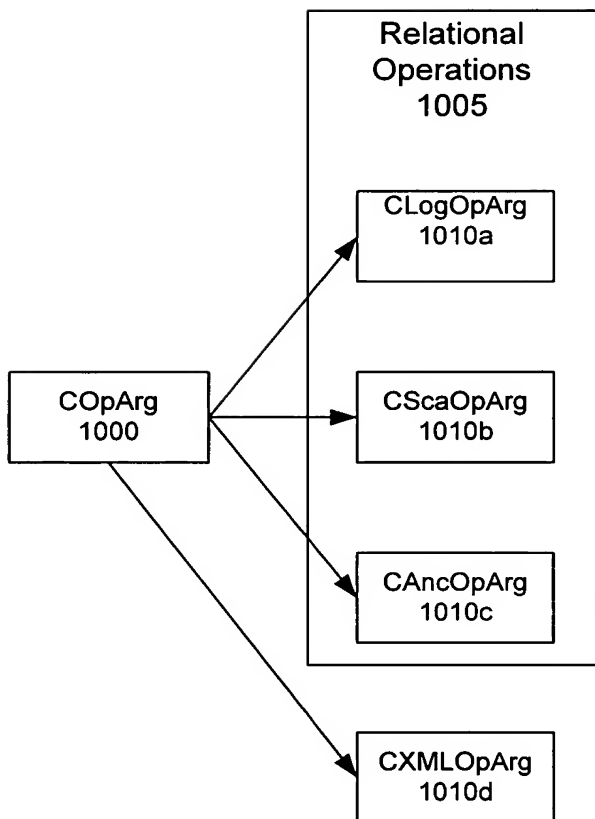
AncOp_PrjList
  AncOp_PrjEl COL: Expr1010
    ScaOp_Intrinsic manufactureconstructordpath
      ScaOp_Const
      ScaOp_Identifier QCOL: [name:3].id
      ScaOp_Const

```

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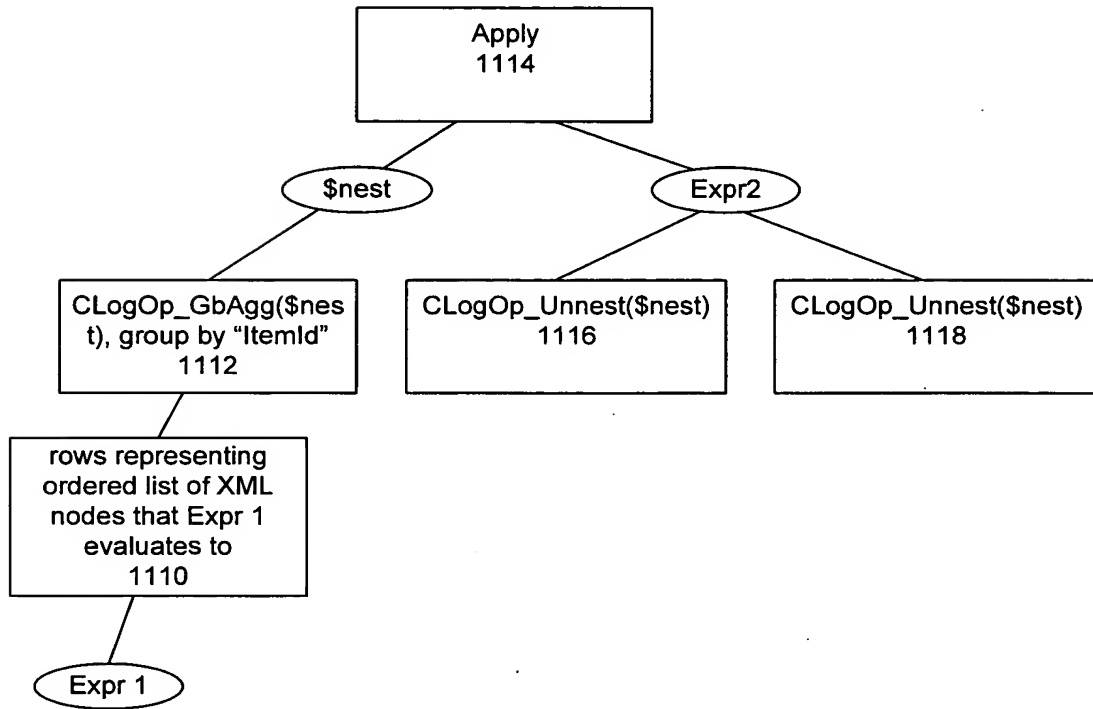
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Fig. 10



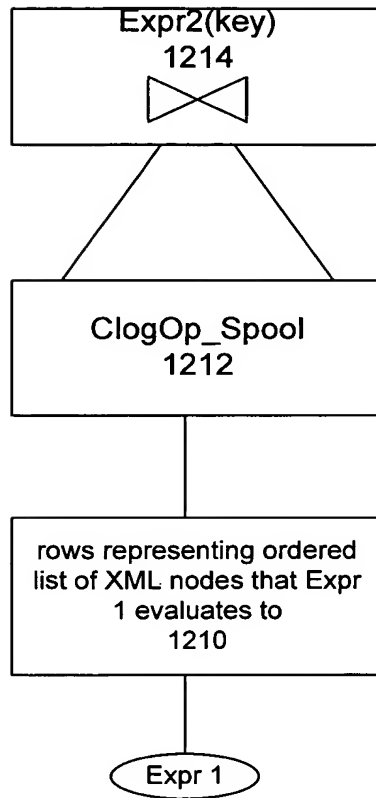
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Fig. 11

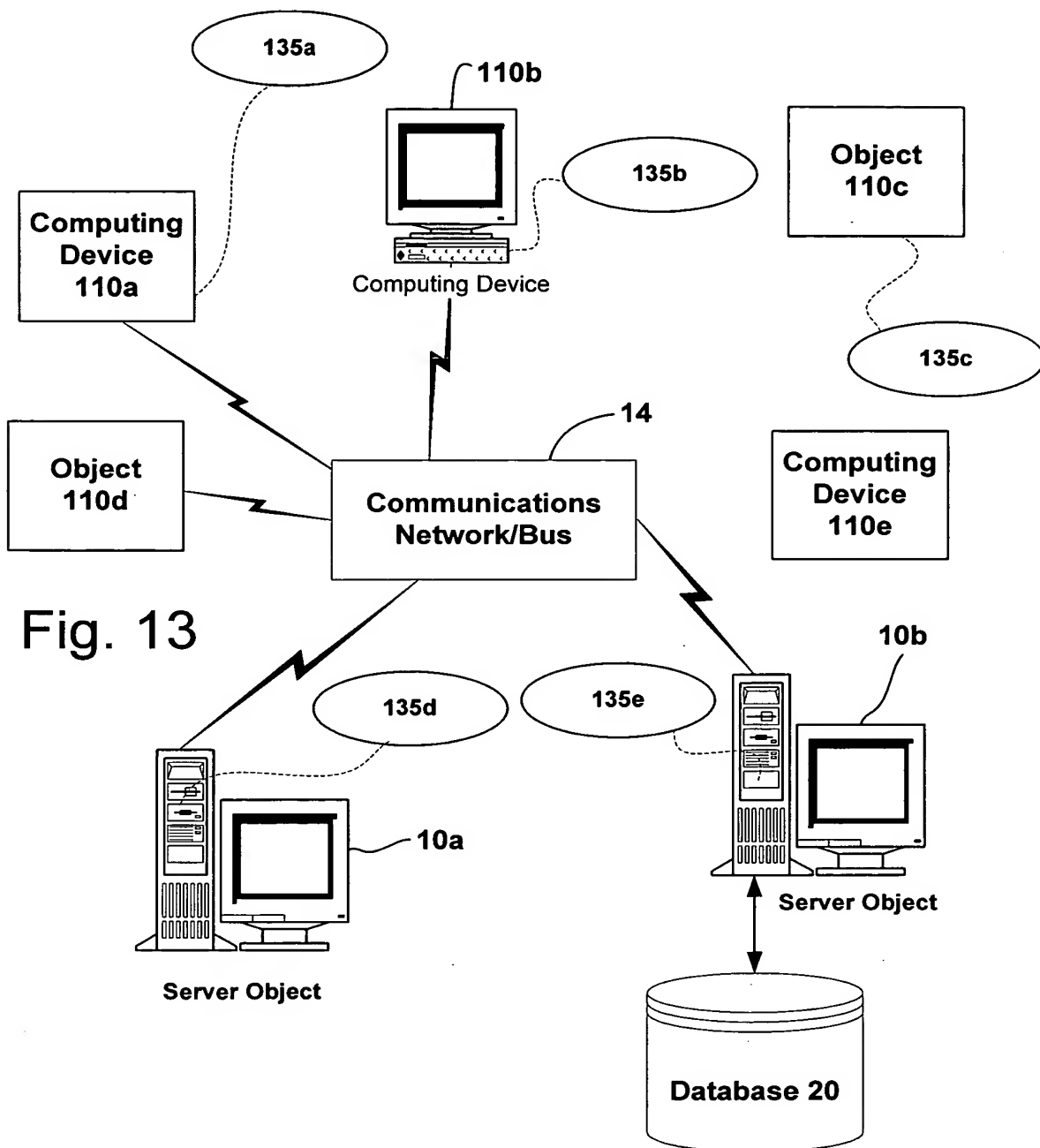


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Fig. 12



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Computing Environment 100

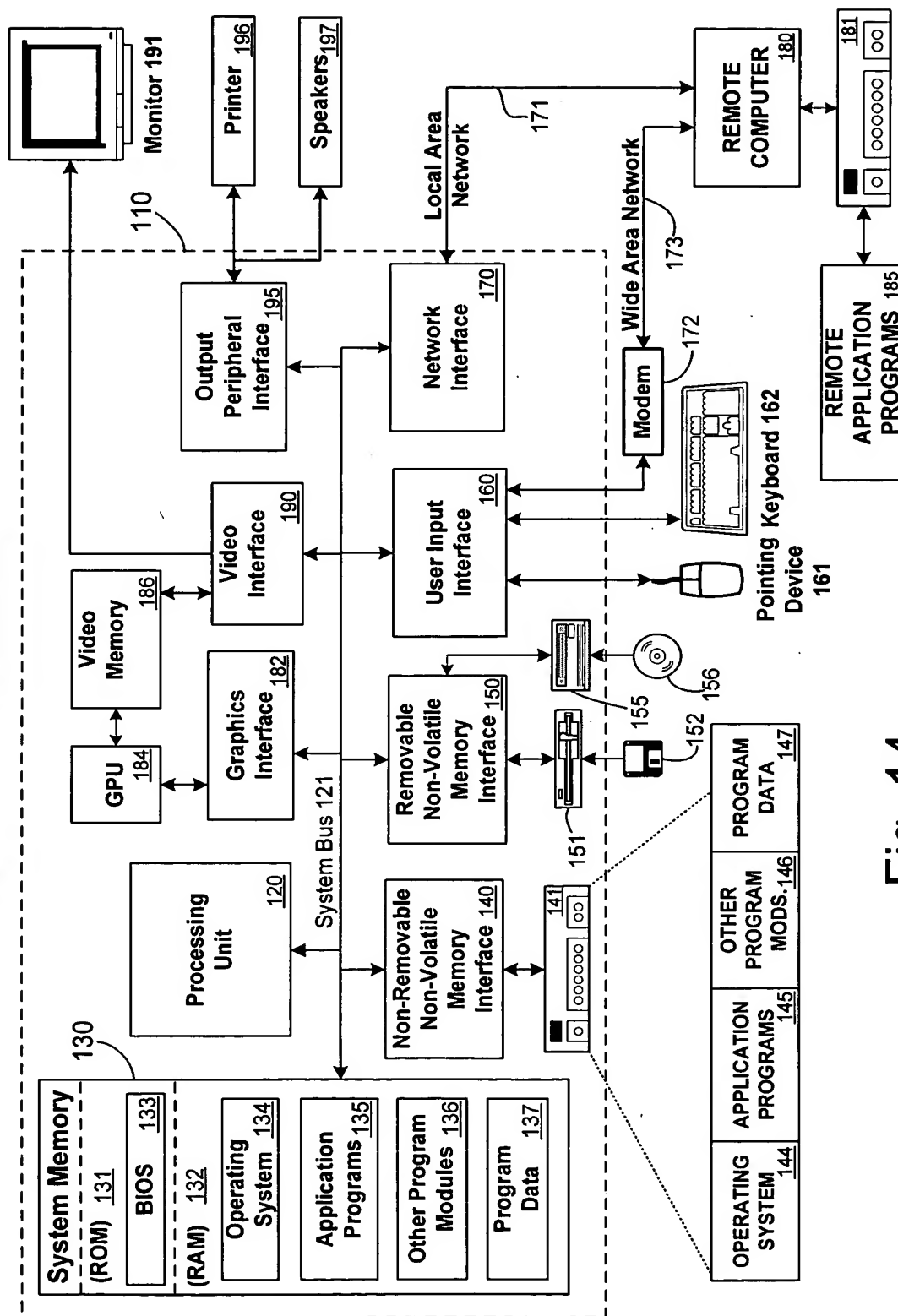


Fig. 14